low-rock, Carroll Co., West Tennessee, collected first in fruit, September, 1867 in flower, July, 1886, *Gattinger;* also, "W. Mississippi or E. Tennessee," *Dr. J. T. Stewart*, 1863. Dr. Gattinger describes it as "growing in a swampy region difficult to penetrate, amidst Rosa Caroliniana and Nyssa aquatica." He found two shrubs, and no more. The Stewart specimen is in the Harvard herbarium, and is simply a fragment of a fruiting specimen which has remained undetermined, but it is undoubtedly this species. The great peculiarity consists in the deeply five-lobed capsule, which is more differentiated than in any other member of the genus and serves well to distinguish the species. Some species are slightly lobed, but in this case the carpels seem almost distinct and are simply held together by their attachment to a central axis, from which they fall away at maturity. The size and general habit of the plant are like H. densiflorum, with perhaps even denser flower clusters, while the broad leaves are exactly those of H. prolificum. Mr. Canby has collected New Jersey forms of H. densiflorum bearing the leaves of H. prolificum, which closely resemble H. lobocarpum, except in the capsule characters. Dr. Gattinger is to be commended for the persistence with which he urged the claims of this species to recognition.—JOHN M. COULTER.

How the humble-bee obtains nectar from Physostegia Virginana.—While passing through a patch of the "False Dragon-head," I noticed that a goodly number of a large species of humble-bee were alighting *on* the flowers and darting their heads deep in between the calyx and corolla, at the upper side of the latter. At first I thought they were collecting nectar from between the calyx and corolla, and commenced to look for the glands. But on inspection, I found that on the upper side of many of the corollas, near the base, was a longitudinal slit, usually near one-third inch long. This was the case in nearly all the older flowers examined, while in those just opened, or still opening, the slit was usually absent. On gently pressing down on the outer portion of the slitted flowers, I found that the sides of the opening were thrown apart, thus exposing the upper portion of the four-lobed ovary and lower parts of the pistil and stamens, and making access easy to the nectary glands at the base of the ovary. In addition to the humble-bee there were a number of other insects visiting the flowers, but they entered in the usual way, through the corolla. It is not unusual to find tubular flowers, especially the closed gentians and Tecoma radicans, with holes eaten through them near the base, through which insects pass in and out, which holes are nearly always made by ants. But I do not remember to have seen any record of instances where an insect made a slit, through which to collect the sweets of a flower.—J. SCHNECK, *Mt. Carmel, Ill.*

Home-made bacteria apparatus.—For the cultivation of bacteria and other microscopic organisms certain utensils are essential, others are very serviceable without being indispensible. The German investigators have given much attention to the construction of incubators, sterilizers, culture vessels of various kinds, implements and accessories in great numbers, and of convenient utility. If it is desired to fit up a complete laboratory for the study of these

low organisms, and the means are at command, it is doubtless best to send to Berlin[1] for the equipment. But for many who have not large bank accounts, and who are still desirous of learning or teaching something concerning bacteria, a few lines about inexpensive, home-made apparatus may prove acceptable.

The necessities are: (*a*) A good microscope, of which nothing further need be said, (*b*) a dry sterilizer, (*c*) a steam sterilizer, (*d*) a water oven or incubator, (*e*) moist chambers, (*f*) test-tubes, (*g*) inoculating needles, (*h*) soft glass tubing, (*j*) pincers.

The dry sterilizer may be made of sheet-iron ("Russia" preferable), and if the walls are double all the better; but the common ovens sold with "oil" stoves may be easiest procured, and answer every purpose. The side door is in

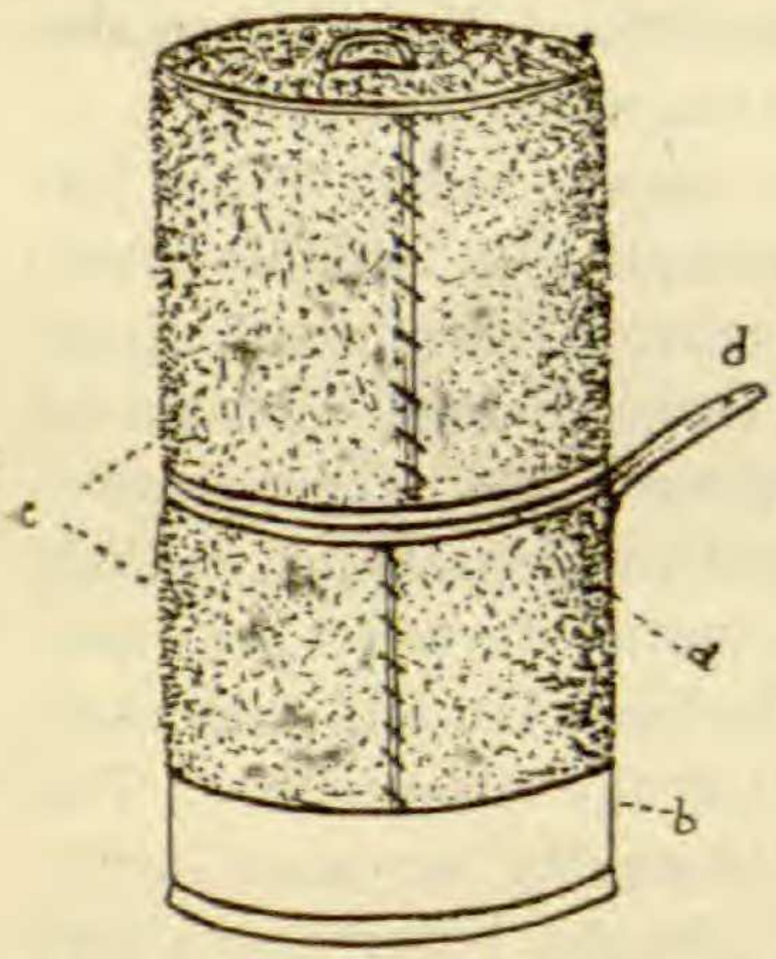

Fig. 1. Steam Sterilizer. *a*, place of division; *b*, protecting ring of tin outside the felt cover: *c*, felt covering; *d*, handle at extreme top of lower division.

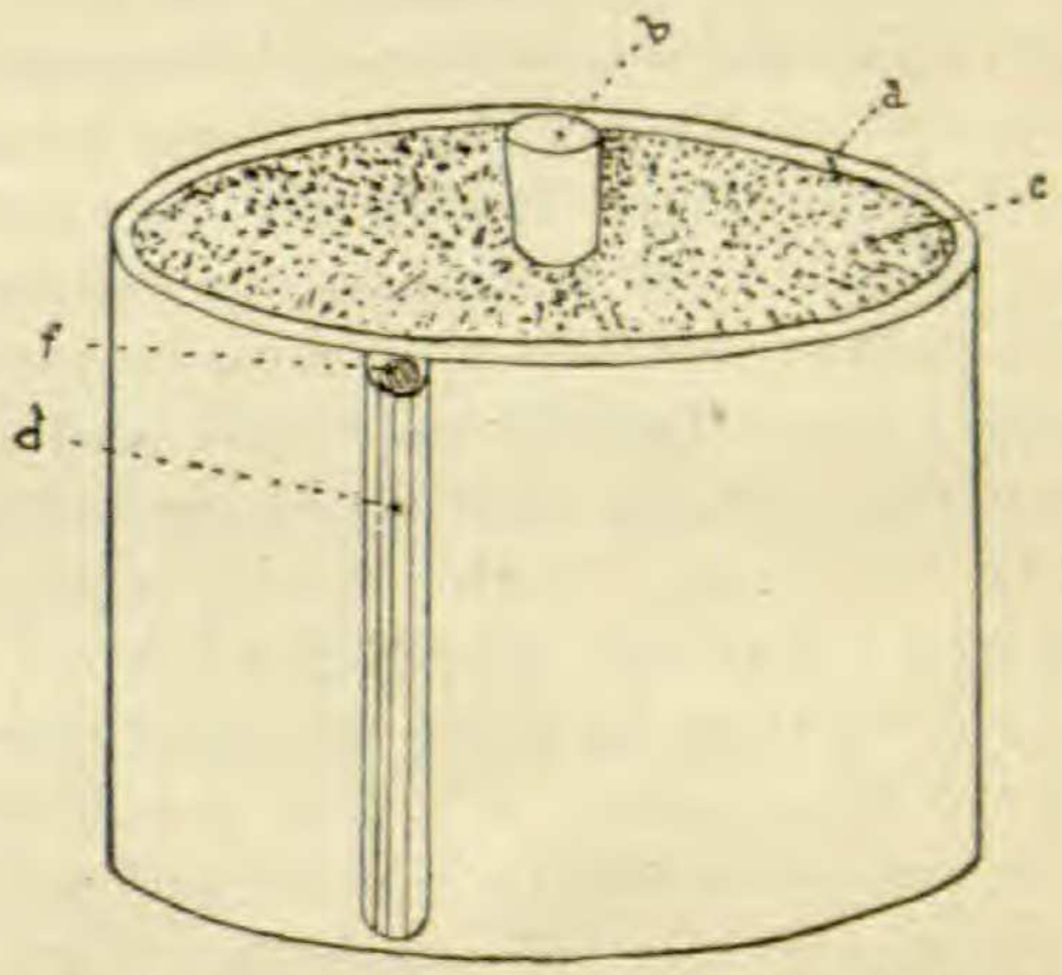

Fig. 2. Incubator. *a*, Double wall for water space: *b*, opening with collar to serve for the insertion of thermometer and for handle: *c*, felt covering on cover; *d*, nose piece for filling water space, observing height of water and for thermometer or gas-regulator: *f*, opening in outer wall of vessel for exit of air and steam.

every way preferable to a cover at the top. The bottom should be perforated to admit the flame and a false bottom pierced with small holes, except near the central area, placed an inch above. Several moveable shelves are required. The size must depend upon the amount of work to be done, but in any case one square foot for the base is little enough, and a greater height is preferable. In this all vessels and utensils which will stand a high temperature, as well as a quantity of cotton-wool for plugs, are to be sterilized by heating to 150° C., or more. It is a good place to keep a supply of test-tubes, etc., ready for use. Keep a quantity of cotton in the upper space. Let this be separated into pellets big enough for plugs before sterilizing.

The steam sterilizer (fig. 1) is a very useful vessel for sterilizing fluids in flasks, test-tubes, etc., and anything else that will not permit a high dry heat. It is used for filtering gelatine, etc., for making meat broth, cooking potatoes and the like. It should be cylindrical in shape, not less than six inches in diameter of base and one foot in height. It should be divided into two equal parts,

[1] Or to Eimer and Amend, 205-211, Third Ave., N. Y. City.—EDS.

so that the upper part may be lifted off and the lower half used by itself. A cover like that of an ordinary tin pail is used. A perforated false bottom (readily removable) is fitted on suitable supports one and a half inches from bottom. When in use this space is to be filled with water. This vessel may be made of tin, but copper is better. Over the outer surface thick felt (to be obtained at the saddler's) may be sewed by bringing the ends snugly together after placing the piece around each cylindrical portion of the vessel. The felt on the cover may be held in place by three or four little "tongues" soldered to the upper surface, passed through the felt and bent down. To protect the felt from the flame a band of tin two and a half inches wide should be fastened around and allowed to project a half inch below the bottom, the lower edge being turned in and up against the vessel.

I can not help but feel that the sterilizer is much simpler than this description. The figure may help to a comprehension of the latter. If tin is used the cost need not be over one dollar and a half, and a dollar more for copper.

The incubator (fig. 2) ought to be made of zinc or copper, preferably the latter. The cheapest (though not the best) form is cylindrical with circular cover. The bottom and side walls must be double so as to leave a three-fourths inch water space. The side walls are closed at the top. Two half-inch holes are to be cut through the outer vessel, one at the *extreme* top vertically over the other near the bottom. At this place a vertical nose-piece three-fourths of an inch in diameter extends the entire height of the vessel covering the holes just mentioned. This is for filling the water space, and for the insertion of a thermometer or gas regulator, as well as to indicate the height of the water within. The cover may be single tin covered with felt, or better (in service, but more inconvenient to handle), of copper, and double for water. In the latter case a side projection containing water connected with that inside will be necessary for heating by a special lamp. An inch hole fitted with an upright collar is to be provided in the cover for the insertion of a thermometer. With the double cover a second hole leading to the enclosed water is desirable for a second thermometer. It is surprising what difference in temperature there is between top and bottom of the space in such a water oven when the cover is single tin unprotected by felt or some such substance—by far too much for the results required. No doubt a thick pine-wood cover, lined with tin beneath, would answer well the requirements. The difficulty which one finds in any such incubator is to keep the temperature uniform and not *too high*. With gas, the simplest way is to have an ordinary lava-tipped burner (instead of a Bunsen burner as commonly used) turned low enough to make the flame nearly or quite blue, and then regulate the amount of heat required by the distance from the vessel to the flame. A small kerosene lamp, "night lamp," may be utilized to good purpose. An incubator as described, of copper with felted tin cover, can be made for four to six dollars.

Moist growing chambers can be satisfactorily secured by the use of a small plate or saucer and the largest goblets or tumblers procurable. A simple circle made of a strip of zinc an inch wide will serve as a support for the glass culture plate. The latter can be cut from good window glass the size of the moist chamber, or less, if desired. In moist chambers it is usually wise to use a one

per cent. aqueous solution of corrosive sublimate instead of pure water. In this case the support for the culture plate should be glass or porcelain. Individual butter plates or saltcellars may be utilized.

Test-tubes five inches long by three-fourths of an inch wide are the most convenient. Instead of these, half-ounce bottles of elongate form and with wide mouths may be used with equally good results.

For inoculating or transferring needles for cultures, platinum is the best. When this is not attainable use brass wire. Heat the end of a slender glass rod five inches long until soft and thrust the wire into the glass for a handle. The wire may be three inches long. One of these should be hooked at the end.

Small sized glass tubing, suitable for drawing out into capillary pipettes, is indispensible for the inoculation of culture liquids through the cotton-wool stopper. This tubing can be found at any chemical laboratory, or may be had of any dealer in chemist's supplies. The same may be said of suitable pincers for handling the sterilized cotton. The latter should not of course be taken in the fingers when corking the test-tubes. The rubber cloth called by dentists "rubber dam," and to be had of them, is serviceable for capping cotton-stoppered tubes or bottles to prevent evaporation. Cut the rubber into suitable squares, and hold in place with a common elastic band. If test-tubes are used a beaker with a little cotton in the bottom serves well for holding, or a little basket can readily be made of screen wire cloth.—T. J. BURRILL.

EDITORIAL.

THE BOTANICAL SPIRIT has been so rampant and the botanists so numerous at the recent meetings of the American Association that there have been frequent suggestions of breaking up the biological section into its constituent parts, or at least of making a section of botany. It is urged that the interests of the present section are so diverse that it is already found convenient to group its papers by subjects for the convenience of those who have no desire to listen to the discussion of all biological subjects, and that botany and zoology have no more relation to each other than certain other distinct sections, and not so much as both to geology. There are several objections to making the proposed change that might be profitable to consider. In the first place, after botany and zoology have been separated they no more embrace single interests than the whole subject of biology, and what is to be the fate of the great field of physiology, so ably represented at the Buffalo meeting? In the second place, such a division, so far as botany is concerned, would simply convert the Botanical Club into a section of botany. This would change a pleasant, informal, social affair into a stiff, business-like, and somewhat heavy body; the small notes, the personal suggestions, the hundred things which are often far more personally beneficial than weighty papers, would be eliminated, and we would predict for the section of botany not a tithe of the attendance, interest, or enthusiasm enjoyed by the Botanical Club. In the third place, the very fact that